

REMARKS

This communication responds to the Office Action of May 14, 2003. At the time of the Office Action, claims 1-42 were pending, and all were rejected under one of 35 U.S.C. § 102 or 103.

Herein, claim 30 is amended to correct a typographical error. Otherwise, the claims are not amended.

1. Rejection of Claims 1-9

Claims 1-9 were rejected as anticipated under 35 U.S.C. § 102(b) by U.S. Pat. 6,057,207 to Lin et al. (hereinafter "Lin"). The rejection is traversed, on grounds that Lin fails to disclose each element of claims 1-9.

Regarding claim 1, Lin fails to disclose the step of "performing a first polish, said first polish comprising polishing said oxide to the level of a first polish stop layer of said multi-film stack." In particular, Lin's etch barrier layer 44 is not a "first polish stop layer," as the Examiner asserts. Clearly, etch barrier layer 44 cannot be a "first polish stop layer" because nothing is on top of it. That is, etch barrier layer 44 overlies the insulating layer 40 that is polished in Lin's first polish step.

In particular, Lin's method, as depicted in Figs. 2, 3 and 4, deposits an etch barrier layer 44 over insulating layer 40. Lin's first polishing step only removes those peaked portions of the etch barrier 40 and insulating layer 40 that are located over the wide raised portions 12A, and does not remove the low-lying portions of etch barrier layer 44 or insulating layer 40 that are located over the trenches 30 or the narrow raised portions 12B. The fact that some of etch barrier layer 44 is being removed, and not other portions of etch barrier layer 44, clearly shows that the first polishing step is not selective to

etch barrier layer 44 and not using etch barrier layer 44 as a polishing stop layer. Hence, etch barrier layer 44 is not "a first polish stop layer."

Moreover, the first polishing step leaves a peak of insulating layer 40 that extends over the upper surface of etch barrier layer 44. The structure of Lin's Fig. 4, with its exposed peak of insulating layer 44 over the upper surface of etch barrier 44 would not be achieved if etch barrier 44 were a polish stop layer. Indeed, Lin states that "the invention uses the depth of the first CMP step to selectively control which width ranges of raise portion the etch openings are formed over." Col. 6, line 65.

It is telling that Lin never refers to etch barrier layer 44 as a CMP stop layer, whereas Lin repeatedly refers to first barrier layer 24 as a CMP stop layer. See, e.g., Col. 7, line 44. This makes clear that etch barrier layer 44 is not a polish stop layer.

Accordingly, claim 1 is not anticipated by Lin, and the rejection must be withdrawn.

Regarding claim 3, Lin also lacks the feature of "etching said trenches through said multi-film stack and into corresponding underlying portions of said substrate." Claim 1 requires that the "multi-layer film stack" include "a first polish stop layer" and "a second polish stop layer." Hence, claim 3 requires that the trenches be etched through both the first and second polish stop layers of the multi-film stack. Lin does not etch his trenches 30 through a "multi-film stack" including both "a first polish stop layer" and "a second polish stop layer." Even if it were true (which it is not) that Lin's etch barrier layer 44 was a first polish stop layer, it is clear from Lin's Fig. 1 that etch barrier layer 44 is deposited after

trenches 30 are etched. Accordingly, claim 3 is not anticipated, and the rejection must be withdrawn.

Regarding claims 2 and 4-9, these claims depend on claim 1, and are not anticipated for at least the same reasons as claim 1.

2. Rejection of Claims 10-15, 19-20, 24-30, 33-37, and 40-42

Claims 10-15, 19-20, 24-30, 33-37, and 40-42 were rejected as obvious under 35 U.S.C. § 103 over Lin in view of U.S. Pat. 6,194,784 to Parat et al.

Regarding claim 10, The Examiner has failed to make a *prima facie* showing of obviousness because the Examiner's combination does not include claim 10's feature of "a first oxide layer disposed above said second nitride layer."

In particular, The Examiner refers to Lin's "oxide liner," which is not shown in any of Lin's figures, as the "first oxide layer" of the claim. Lin refers to the oxide liner at his col. 5, line 20. However, Lin merely states that the oxide liner "can be formed in the trenches 30 over the substrate surfaces." Lin does not state that the oxide liner forms over the nitride first etch barrier layer 24. Moreover, Lin states that the oxide liner preferably is a "thermal oxide layer." Clearly, such an oxide liner layer would not form over the nitride layer, but only over the exposed silicon surfaces of the trenches 30. Accordingly, the Examiner has failed to make a *prima facie* showing of obviousness, because the Examiner's combination does not include all features of the claim.

The rejection of claim 10 also is improper because a person of ordinary skill in the art would not add Parat's upper oxide layer to Lin's process. Indeed, Lin completely fills his trenches 30 with his oxide insulating layer 40. Accordingly, there is no reason to deposit Parat's upper oxide layer 21 over

Lin's etch barrier layer 44, since Lin's trenches 30 already are filled. In other words, the Examiner is adding an extra step that would have no purpose in Lin's process.

Accordingly, the rejection of claim 10 over Lin and Parat is erroneous, and must be withdrawn.

Regarding claim 11, Lin's first CMP step does not disclose the feature of "polishing said trench oxide to expose said first nitride layer." As shown by Lin's Fig. 1, Lin's etch barrier layer 44 is a topmost layer, and is therefore exposed before Lin's first CMP step. Accordingly, the rejection of claim 11 must be withdrawn.

Regarding claim 29, the Examiner did not specifically address the features of claim 29. That is, unlike the other claims, the Examiner did not list claim 29 with any of the other claims at pages 4-6 of the Office Action. Accordingly, the undersigned can only guess that the Examiner's reasoning associated with claim 11 applies.

In any event, the rejection of claim 29 as obvious over Lin and Parat is erroneous, because the Examiner's combination does not include all features of claim 29. In particular, claim 29 includes "depositing a first oxide layer over said second nitride layer." This feature is not shown by the Examiner's combination, for the same reasons stated above for claims 10 and 11.

In addition, the Examiner's combination fails to disclose claim 29's feature of "etching portions of said multi-layer film stack and corresponding underlying portions of said substrate to form at least two trenches." Lin does not include such a step. As shown by Lin's Fig. 1, his trenches 30 are formed before the formation of Lin's oxide liner layer and his etch barrier layer 44.

Accordingly, the rejection of claim 29 is erroneous, and must be withdrawn.

Regarding claim 30, Lin does not disclose the step of "polishing said oxide to expose said first nitride layer." As shown by Lin's Fig. 1, the nitride etch barrier layer 44 is a topmost layer that is exposed before Lin's first polishing step. Accordingly, a *prima facie* case of obviousness has not been made.

Regarding claim 34, Lin does not disclose the step of removing the "first nitride layer" "using a hot phosphoric acid etch." As shown by Lin's Figs. 2, 3, 6 and 7, Lin's nitride etch barrier layer 44, which the Examiner reads on the "first nitride layer" of the claim, is removed by Lin's first and second polishing steps. Col. 6, line 47 et seq., and col. 7, line 39 et seq. Accordingly, since the Examiner's combination lacks this feature, the rejection must be withdrawn.

The rejections of the remaining dependent claims 12-15, 19-20, 24-28, 33, 35-37, and 40-42 also should be withdrawn, at least for the same reasons as their underlying independent claims.

3. Rejection of Claims 16-17 and 21-22

Claims 16-17 and 19-22 are rejected as obvious under 35 U.S.C. § 103 over Lin, Parat, and U.S. Pat. 5,930,645 to Lyons et al. These claims all depend on claim 10, and are submitted to be non-obvious over the Examiner's combination for the reasons stated above for claim 10.

4. Rejection of Claims 18 and 23

Claims 18 and 23 are rejected as obvious under 35 U.S.C. 103 over Lin, Parat, and U.S. Pat. 6,194,784 to Iyer. These claims all depend on claim 10, and are submitted to be non-

obvious over the Examiner's combination for the reasons stated above for claim 10.

4. Rejection of Claims 31-32 and 38-39

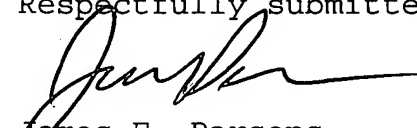
Claims 31, 32, 38 and 39 are rejected as obvious under 35 U.S.C. § 103 over Lin, Parat, and U.S. Pat. 6,057,207 to Satoh. These claims all depend on claims 29 and 30, and are submitted to be non-obvious over the Examiner's combination for the reasons stated above for claims 29 and 30.

CONCLUSION

Claims 1-42 are pending in the present Application.
Reconsideration of these claims is respectfully requested.

If there are any questions, please telephone the
undersigned at (408) 451-5906 to expedite prosecution of this
case.

Respectfully submitted,



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